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POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

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America's Greatest Postoffice Building

So Long Was It Being Built that at Its Completion It Is Found Too Small for Chicago's Needs

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THE GREATEST POSTOFFICE IN AMERICA.

Colossal Structure Begun Seven Years Ago to Be Completed in Three Years.

In Chicago the sun seems to rise from out Lake Michigan and its first rays of light are reflected on the gilded dome of the new postoffice building. As the sun, seeming to drip with the lake waters, climbs higher into the heavens the great dome is all aglow and looks like a huge ball of fire. The dome is made of glass underneath which is placed the gilding. Six great bronzed eagles look down from where the curve of the dome begins on the massive pile of stone below. Above all from a flag pole higher than the highest skyscraper in Chicago floats the stars and stripes. The finishing of work on the dome marks the completion of the exterior of the greatest postoffice and government building in America outside of Washington, the seat of government.

But even with its colossal proportions the building is now by far too small to accommodate the growing business of the Chicago postoffice. It took so long to build the structure that it was too small for the city's needs when completed, and now another building is necessary.p It was nine years ago when the plans for the structure were made and it has been seven years since the work was actually begun. Only the exterior is now completed and it will be probably three years longer before the structure is ready for occupancy. Now it is proposed, in order to accommodate the great postal business that has grown up while the new postoffice was in progress of construction, that another building of equal size be built on the lake front. It is the plan of Postmaster Coyne to have this future building devoted exclusively to postoffice business and entirely separate from other government departments.

While the slothful work on the Chicago postoffice is quite a stigma on America's reputation for doing things in a hurry, and has furnished material for the English to argue that Americans are the slowest people in the world, there is no denying the fact that the contractors had a mammoth job on their hands in completing this remarkable edifice. In its solidity it bears a resemblance to the architecture of ancient Greece and Rome. While the work has not progressed as rapidly as on modern buildings, the new postoffice will be standing when not a wall of the other buildings now in Chicago will remain. They will either long since have crumbled to dust or more probably have been replaced several times by other walls. The new postoffice is the largest and most pretentious structure in the entire city of Chicago. Its total cost including the site amounts to about $10,000,000. A postoffice that cost $7,000,000 was torn down to make room for it. The structure contains 500,000 cubic feet of stone. Every stone was brought in a separate frame from the quarries of Mount Waldo, Me. In the building there are 11,000,000 tons of steel. The dome alone contains more steel than many of the city's greatest skyscrapers.

It may be understood why such a gigantic building is inadequate to Chicago's needs, when it is known that the city's postal business has about doubled since the plans for the postoffice were drawn. The business is now greater than that of Philadelphia and Boston combined. Its revenue equals that of St. Louis, Brooklyn, Cincinnati, Baltimore, San Francisco and Pittsburg combined. The revenues amount to more than $8,000,000 a year. The Chicago postal district comprises an area of 190,138 square miles. The postoffice employs 4,000 carriers. There are 47 free delivery sub-stations. Twenty-one of these stations have, each, a sufficient revenue to be classed as first-class offices if independent of Chicago and some of them do a larger business than some of the greatest cities in America.

SCHOOL OF TECHNOLOGY THE SCHOOL OF THE FUTURE.

Radical Reform in Education Urged by Prof. Triggs.—Would Democratize the System.

By Prof. Oscar L. Triggs, of the University of Chicago.

Employers of labor do right in questioning the fitness of college graduates for practical affairs. The advice given to the graduates of schools, who are now "going forth," as the phrase is, in such numbers, would be humorous if it were not so pathetic. Most of the graduates "going forth" have been trained for other conditions than those they must actually meet if they enter upon an industrial career.

The ideal of culture upheld in colleges is an ideal derived from feudal and aristocratic conditions; it is a culture which can be effective for the individual only in a state of comparative idleness.

For years prior to their graduation the students have lived in an artificial community—a comunity that has as its basis the idea of privilege—a privilege extending, on the one hand, to the free use of enormous endowments, and, on a lower plane, to the license claimed by college boys to play pranks on Hallowe'en nights and to sing and shout in the streets and on the trains.

The time would seem to be opportune to establish in the world a new idea of culture. The old culture, the culture of the mind, is static, and is symbolized by a scholar passively acquiring knowledge in a library. The new culture, the culture of life, is dynamic, and is typified by the man of affairs subduing nature to his uses.

Schools are built from high motives and to inculcuate high principles, the expectation being that the community will be reformed to the image of the school. But somehow the homes and factories outside the school are as sordid as ever. The Jewish training school seeks to develop equally the head, the heart, and the hand; but where in the community is there a chance for the exercise of this training? The superintendent of this school, if his work is to be effective, ought also to be the supervisor of the streets, the agent of the tenement houses. This, of course, is impossible, but the illustration will suggest the truth of my saying, that when you socialize the school you have on your hands not merely an educational problem, but a social and economic problem as well.

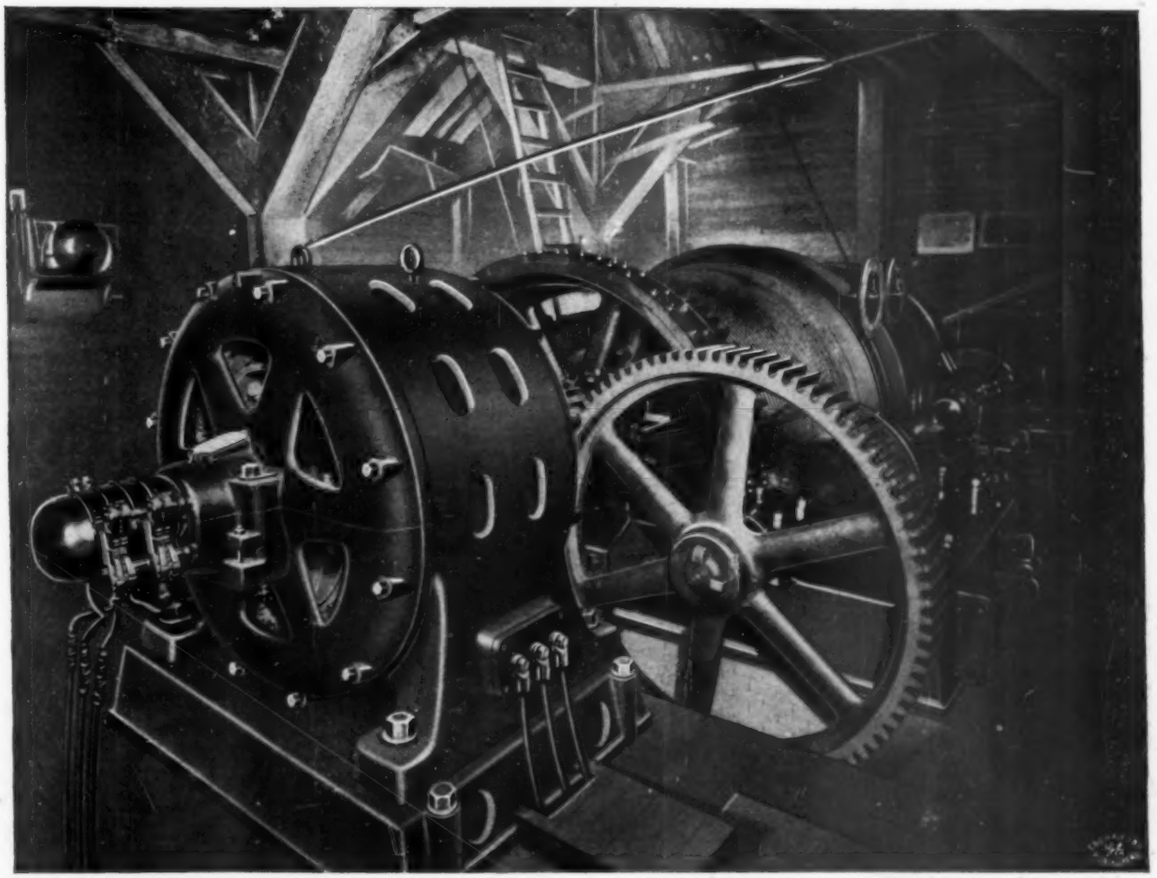
This brings me to the point of seconding a proposal which has been made by Mr. Hirsh and Mr. Bamberger; that in connection with the training school here shall be established a workshop for commercial production, a workshop into which the school shall graduate, affording a professional career for those who desire to enter the higher industrialism.

The plans of such a workshop need not be elaborated in detail at this time. The workshop I have in mind as appropriate for the situation is an industrial laboratory, a kind of graduate manual training school, a place where commercial products might be made, yet where training in the higher craftsmanship may be given to apprentices, and where experiments in the higher industrialism may be engaged in by masters of craft.

Technological institutes afford a necessary training in certain industrial professions, and I am pleased to note the departure recently made by the Armour Institute in its desire to give technical instruction to the wage earners by correspondence. I believe the Tuskegee Institute, as directed by Booker T. Washington, was the first genuine effort to democratize education. It would be surprising, would it not, if a school for the education of negroes became the model for the future educational system of the United States? Certain it is that what may be called broadly "a school of technology" will be the favorite type of school in the future.

On the whole, I am right in saying that the attitude towards work of educators is that of indifference. The converse proposition is certainly true, that to the culture of the colleges the labor world is itself indifferent, if not actively hostile.

Elevator Hoists and Their Uses---Part I



GREAT DOUBLE DRUM HOIST IN THE BOWELS OF THE EARTH.—The electric hoist has worked a metamorphosis in mining operations. It is as superior to the old hoisting machine as is the electric car to the horse car for street traffic. It is more easily installed, takes up less room, does away with boilers, coal bins and piping; it can be operated by one man; there is no loss by condensation, leakage of steam pipes and troublesome drains; wires can be run any distance from a power company's transmission line to the mine where the hoist is needed; the hoists are portable and may be readily moved, wires and all, from one mine shaft to another with little delay; there is no danger from fire or explosions and in other ways too numerous to mention the electric hoist attests its superiority over the old time methods. The accompanying illustration shows a wonderful electric hoist planted down deep in the bowels of the earth at the Le Roi mines near Rossland, B. C. It is a double drum hoist and is operated by Westinghouse Motor.

DON'T BE A SQUEALER.

Governor Odell, of New York, relates an incident in his childhood which made a lasting impression upon him. His father called him one day into the barnyard where there were two litters of puppies. Seizing one by the neck the elder Odell held it out at arm's length. The pup gave forth a lusty whimper which continued even after it had been put back with its mother.

"That's a squealer," he said.

Then he grabbed a pup from the other litter. The dog squinted his eyes, shut his little teeth together hard, and made a wry face, but never a sound escaped.

"That's a thoroughbred," he remarked. "My son, never be a squealer." And he never was.

In putting on belting, it should be stretched as tightly as possible, and with wide belts this can be done best by the use of clamps secured firmly to each end of the belt, and drawn together by clamp rods running parallel with and outside the edges of the belt. There is no danger of breaking, as a belt 6 inches wide and three-ply thick will stand a direct strain of 5000 pounds, and others in proportion.

There have been 1,500 patents granted for oil burners. An average of 25 patents are granted each week.

HIGH SPEED COSTS MONEY.

Much has been said of late regarding the speed of the German Atlantic greyhounds, says the London Telegraph, but not enough, perhaps, has been said regarding the cost of this speed. The latest creation of the North German Lloyd Kaiser Wilhelm II., is designed to do twenty-four knots an hour at an expenditure of 40,000 indicated horse power. Our White Star Line Cedric, the largest ship in the world, will go seventeen knots with 14,000 horse power. But, says The Shipping World, the Kaiser Wilhelm will burn 750 tons of coal per day, which is 190 per cent more than the Cedric, and she will need 256 more hands to work her. Curiously enough, of her crew of 600, only 45 will be ordinary sailors, the remainder being mechanics of various orders.

A boiler when about to be laid up for a season should be thoroughly cleaned on the inside, filled with water with steam on, so as to be full of hot water that has been boiled, up to the safety valve. The flues and fire surface of the boiler should then be cleaned; ashes and soot removed from every part where such lodge. Then close fire doors, ash pit, and put a cap on the smokestack. With this treatment laid-up boilers do not rust inside or outside. It is the moist air drawn through a laid-up boiler that does damage by rust.

Remarkable Experiments with Gasoline

"Not an Explosive," says E. W. Roberts, Who Advances Entirely New Theory --- The Small Boy, However, is Admonished to Go Slow if he Doesn't Want to Go Up

Gasoline is not an explosive, according to the claims of Prof. E. W. Roberts, and it is derived from the chemical action of dead animals buried in the earth's convulsions of thousands of years ago. Prof. Roberts states:

"Although widely employed as a fuel for heat, light and power purposes, gasoline is a substance the properties of which are not generally understood. Quite a number class it with explosives such as gunpowder and nitroglycerine, while in point of fact gasoline alone is not in the slightest degree explosive. To secure an explosion in a gasoline engine, or anywhere else in fact, by the use of gasoline, it is necessary to have present a certain proportion of air. This is but one of the superstitions about this fuel which the writer hopes to dissipate.

"To start at the beginning: Gasoline is the product of petroleum midway between benzine and kerosene, or rather, it consists of a series which, in the selective distillation of petroleum,

Fig. 1.- Applying a Match to a Gasoline Can Nearly Full

is obtained after the benzine has been evaporated and before kerosene commences to be distilled. In the oil trade it is known as naphtha, being devided into three grades. A naphtha, B naphtha and C naphtha, A naphtha being that last given off and hence having the greatest specific gravity. By the retail trade it is generally known as gasoline, and is sold according to its specific gravity, which is designated by so many degrees on an arbitrary scale known as Baume's scale. Stove gasoline having a specific gravity of 72 degrees Baume is that generally employed for gasoline engines, although gasolines from 66 degrees to 76 degrees may be used with success when employed with a vaporizer.

"Petroleum and all the products derived therefrom belong to a family of chemical compounds known as hydrocarbons. The name comes from the elements hydrogen and carbon, of which there are a large number of different combinations. These vary from a light gas, as methane or marsh gas containing one atom of carbon and four atoms of hydrogen, down through heavier gases and then through a long series of liquids, starting with the petroleum ethers and ending with the heavier machinery oils. Following these come vaseline and the solids, such as paraffine and finally coke.

"Varying proportions of the two elements give substances having different physical properties. Naturally the greater the proportion of hydrogen, the less the density of the hydrocarbon. Quite frequently hydrocarbons having the same proportions precisely of the two constituents show different physical properties."

These remarkable statements of Prof. Roberts are contained in an interesting article he has contributed to Marine Engineering, the well known authority on all maritime subjects. In telling of how the gasoline (which smells bad yet) has its origin from the dead animals of many centuries ago, the professor states:

"The origin of petroleum is interesting, particularly as the popular belief attributes it to the same source as coal. The latest investigations, however, point to an animal origin. In prehistoric times convulsions of the earth's surface caused the burial of large quantities of sea animals, principally of the mollusca. Disintegration followed without the presence of oxygen, the usual process of decay could not ensue, the fleshier portions of these animals were finally transformed into petroleum, which finally settled into cavities and the interstices of the Trenton shales. The familiar term "coal oil" is therefore a misnomer, for, although hydrocarbons similar to the petroleum products have been artificially produced from coal, those in nature are undoubtedly of animal origin.

"Passing from the general to the specific, the properties of gasoline will now be discussed. C naphtha, having a specific gravity of between 68 degrees and 78 degrees Baume, is quite volatile, vaporizing voluntarily at ordinary temperatures and boiling at temperatures ranging between 160 degrees and 260 degrees F., according to density. The evaporation is so rapid at ordinary temperatures that a vessel partially filled with gasoline will soon drive all the air from that part above the liquid, so that it contains gasoline vapor alone. Since gasoline vapor will not explode unless it has a certain proportion of air mixed with it, the contents of the vessel above the liquid are nearly always non-explosive. In order to illustrate this and other properties

Fig. 2.—Pouring Garoline Through a Flame from One Burning Can into Another

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of gasoline, the writer has performed several experiments before the camera especially for this article, the photographs being reproduced herewith.

"In Fig. 1 is shown an ordinary gasoline can, nearly full, to which a lighted match is being applied at the opening. That the gasoline takes fire without explosion may be readily seen by the large flame above the opening, the result being practically the same as lighting gas at a jet. No explosion could possibly follow in this case, as there is no air in the can, and a close inspection shows, before the match is applied, that vapor is slowly issuing from the can.

"In Fig. 2 is shown a seemingly dangerous operation, in which half the contents of the can in Fig. 1 has been emptied into another receptacle and the vapor lighted at the opening. To accentuate the flame a small quantity of gasoline has been poured on top of this can. Gasoline is being poured through the flame into the can, as is plainly shown in the photograph. This experiment may be performed with impunity, the only precaution necessary being to keep the hands out of the way of the flame, so as not to scorch the fingers.

"In Fig. 3 is shown a can from which is issuing a tiny flame,

Fig. 3.—Extinguishing a Burning Gasoline Can with a Sponge

the vapor burning as it passes from the can. The writer is about to extinguish the flame with his handkerchief, showing a simple but effective method of extinguishing a fire on the top of any vessel containing gasoline. In fact two or three smart blows in rapid succession with the bare hand will accomplish the same result without the slightest inconvenience. This was the method employed in extinguishing the flame after the experiment shown in Fig. 2, the blow of the hand on the filling hole at the same time extinguishing the flame at the spout because of the forcible ejection of the vapor, driving the flame too far away for it to get back. The blazing gasoline on top of the other can soon burned itself out, and a blow of the hand was sufficient to extinguish the tiny flame remaining at the opening."

Note: The small boy or others, not familiar with the properties of gasoline, should they try to test them might find Prof. Edwards' experiments and theories not particularly conducive to longevity.

SCHOOLBOY BUILDS AN AUTOMOBILE

Polished Stoves After School Hours to Earn Money for Material.

When a schoolboy can build an automobile for himself, why cannot everybody have his own motor vehicle? The illustration shows a remarkable gasoline carriage built by Mark Richards, an Aurora (Ill.) boy. Master Richards and a school girl friend are in the carriage enjoying one of their regular

Schoolboy's Home Made Runabout

afternoon rides. While building the machine the boy's friends laughed and made fun of him, but he kept at his task and now it is his time to laugh; for he is the favorite of all the girls and the envy of all the boys in town.

In a letter to the Motor Age Master Richards says: "The carriage was built by working after school hours. As it was necessary for me to earn the money required for building it, I was forced to divide my working time between blacking stoves and automobile building. The car is driven by a 4x5-inch single cylinder water cooled engine. The maximum speed is about 1,200 revolutions. Before I started to build the engine I had no knowledge of the principles and practice of gasoline engine construction, yet I not only managed to make it but to build the transmission mechanism, friction clutch, spark timing mechanism, body running gear, etc., even doing the necessary blacksmithing. The running gear is made of 1-inch gas pipe with malleable iron pipe fittings corresponding to the lugs used on standard tubular running gears. The joints are pinned and brazed. The induction coil for the junp spark system of ignition is of home construction. It has given good results and I have been able to secure an inch and a half spark through the air. I use a Dow plug.

"While building the machine many of my friends made fun of it, but I stuck to the job and am gratified with the result."

MACHINE SIZES AND GRADES TOBACCO.

A machine for sizing tobacco has been invented by J. W. Stanton of West Springfield, Mass. It is expected that the device will also aid in the work of sorting. The same grades of tobacco leaves usually grow in the same relative positions upon the stem and are accordingly of practically the same length, so that in sizing, the different grades are generally separated as well as the different sizes.

Heretofore the work of sorting and grading tobacco leaves has all been done by hand. A bunch of leaves were taken upon the sizer's table and one by one selected and deposited in the proper boxes.

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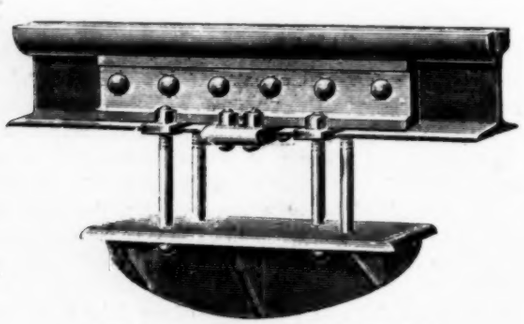
HOLD-DOWN RAIL JOINT.

This peculiar rail joint is now being used on the street railways in England. The Electrical Review, London, says: The joint consists of a sole piece, or plate, provided with long hold-down clip bolts. The plate is set 9 inches below the rail, the space above being filed with concrete. The bolts are screwed at the upper end and fitted with nuts. In the event of a rail working loose, the practice where the hold-down joint is in



Showing Mechanism of the Hold-Down Joint

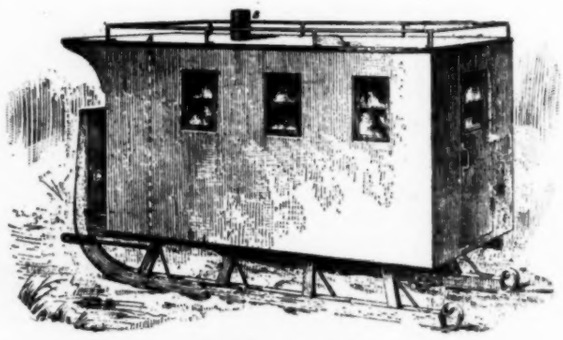
use is to take up one or two sets near the joint and to slacken down the bolts, wedge up the rail, and run in cement grout under the rail. In about an hour the bolts can be tightened up, when the rail or joint will be found to be firm. The hold-down joint has, however, as great elesticity as the rail, so that undue rigidity is not attained.

To solder a piece of carbon and a piece of brass together, copper the carbon with a battery, then attach the brass with soft solder.

To fix bolts in stonework a mixture of three parts sulphur to one part Portland cement is good.

MAIL SLEIGH OF EARLY DAYS.

The advent of the railway coach was, in a majority of cases, the death knell of the old, old mail sleigh, a veritable house on runners, of which the sketch herewith shown is an excellent likeness. The dotted line A shows position of partition between the interior of the sleigh and the driver's seat.



Old Time Mail Sleigh

This left an enclosed seat on the sides and back of about 18 to 20 inches deep, says a writer in the Blacksmith.

The space C was fitted with a door on each side, which opened to the front and was as high as the dashboard. The bottom of the driving section was furnished with a large box, which had an ample amount of oat or rye straw therein. Under the seat were the mail pouches. The space was also supplied with buffalo robes and blankets. This was the "second cabin" of the sleigh. The roof projected beyond the front pillar, and in real boisterous weather was supplied with curtains. B is the smokestack or stovepipe. Each sleigh was furnished with a sheet-iron wood-burning stove about 30 inches long, 12 inches wide and 12 inches deep, placed in a box in which was sand. A fender projected about 6 inches from the stove all the way around it. The stove was secured to the floor, its front end about 20 or more inches from the front partition, in which space was the wood-box, which was supplied at each relay station.

There was a rail on top by which to secure the baggage and express freight. A glass door, about 8 by 10 inches, was placed in the front portion, so that the driver might make observations and communicate with his passengers. There were three windows of two panes each on each side, and one window in the door at the back. Boxes of straw were under the seats for those who wished to place their feet in them.

The bodies were made for comfort, not as models of beauty, and projected beyond the runners on each side. The runners, posts and beams were made very strong. Four horses were usually employed. Hanging to the leader pole at night was a perforated tin lantern supplied with one, two or three "dip" candles of the period. A similar lamp was suspended from the roof of the "cabin," about two feet abaft the smokestack.

The passengers had to do their own "stoking" (firing) or go cold. There was always an ample supply of buffalo robes. The seating capacity—inside—first cabin, was for about twelve persons. Smoking was not allowed anywhere on board the craft. For a long winter's journey over the snow they were really comfortable. It is doubtful if any are in existence to-day, and quite probably not many persons are living to-day who ever saw one of them.

To keep machinery from rusting dissolve one ounce camphor in one pound melted lard; remove the scum; mix as much black lead with the lard and camphor as will give it an iron color; clean the machinery well; smear with the mixture; after twenty-four hours rub off; clean and polish with soft cloth.

Most Remarkable Car Ever Built

The Chililitli of Mexico, a Delight to Tourists and Marvel of Construction

There is not another car in the world like the Chililitli. Mexico is its home. It is a beautiful sight as it speeds past the mountainous heights and through the palm shaded forests of the tropics all aglow with light and merry with music and the laughter of the tourists. The car is as remarkable in its construction as it is beautiful and delightful. It is built to run on either narrow or broad gauge tracks so it follows the tourists train wherever it goes through the land of the Montezumas. It goes behind the train merely as an annex for the pleasure of the traveler. A kind of roof garden on wheels, it is a resort for the passengers when they weary of the sleepers and day coaches. It is the first perfect observation car ever built. Its sides are the kaleidoscopic views of tropical scenery that follow in fast array and never ceasing interest as the train glides on, and its top is the blue canopy of the far southern heavens.

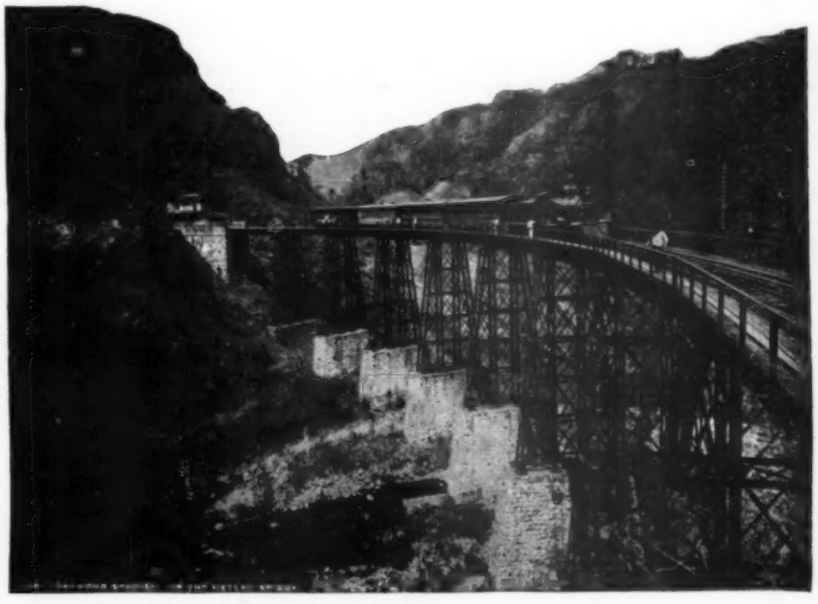
The Chililitli in Mexico

The Chililitli was built by the Pullman Car Co., especially for the American Tourists' Association. It is to make a tour of all Mexico on an extended itinerary of 37 days beginning January 27. This will be one of the most delightful trips ever undertaken. Just at the time when man and beast are struggling with pain begrimed winter in the great cities of the north, these tourists will be merrily speeding along in the balmy breezes of Mexico's delightful clime.

The Chililitli has a canvas top that may be raised or lowered as required. It serves as a dining car, observation car, lounging room, cafe and general recreation resort for the passengers. Fifty-six people may dine at one sitting.

EXCELLENT FURNITURE POLISH

One of the best furniture polishes is made of equal parts of salad oil and vinegar shaken up together. Apply very sparingly with a soft flannel, and polish thoroughly with soft cloths till not the faintest trace of oiliness remains. Remember that an important adjunct to this polish is "elbow grease," and that without it the polish is worse than useless, for any oiliness left on it will only gather the dirt and make the furniture dull.



Crossing the Picturesque Metlac Bridge, Mexico.

EDISON'S BATTERY IN FAVOR.

Arrangements are being made in London for the establishment of a series of European factories for manufacturing Edison's new automobile battery. It is predicted that within the next year works for its exclusive production will be erected in England, Germany, France, Belgium and Austria. Patents have already been secured in every country in the world. The construction of the plants will begin as soon as the inventor has finished the 5,000 miles endurance test to which he is now subjecting his invention. Among others who are interested in Edison's attempts to revolutionize the motor industry is Mr. Balfour, the British premier, who is an ardent automobilist and an intelligent student of electric traction.

ALLOY FOR LINING BUSHINGS.

For lining bearings, crank-pin bushes and other parts, exclusive of crosshead bushes, the following alloy has, in hard ocean steaming, been found, after extended experience, to give good results: Twelve parts tin, one part copper, one part antimony, mixed in the following way: Six parts tin alloyed with one part antimony, and six parts tin with one of copper, and the two mixed together. For lining crosshead brasses the following harder alloy has been found to give good results: 85 per cent tin, 5 per cent copper and 10 per cent antimony.

Easy Electrical Experiments

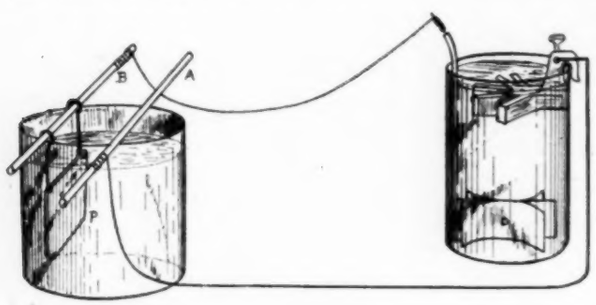
By L. P. Dickinson

HOW TO DO ELECTRO-PLATING AT HOME.—PART I.

Electro-plating is the art of covering metallic bodies with a thin coating of some other metal by the aid of the electric current.

The process may be explained as follows: Imagine two metal plates dipping into a solution containing some metallic salt. If a current be sent through the solution, passing from one plate to the other, the solution will be broken up by the action of the current, and a portion of the metal formerly held in solution will be deposited upon the plate where the current leaves the liquid. Thus if a copper and lead plate dip into a solution of copper sulphate, and an electric current be sent through the solution from the copper to the lead plate, copper will be taken through the solution, and deposited upon the lead plate.

The process outlined above appears simple, but in practice several points must be looked after. First, the article to be plated must, for the sake of appearance, be rendered smooth and free from scratches, for every line on its surface will be faithfully brought out in the deposit. Next, the surface of the article to be plated must be clean. This is necessary, because otherwise the deposit will scale off. By clean, is meant chemically clean,—that is there must be no trace of grease or foreign substance upon its surface. Even the slight film which would result from touching an article with the fingers will ruin the



deposit. Next, it is necessary to secure an even deposit free from streaks and blotches. And finally, the finished article must be polished, as deposits as they come from the plating bath are rarely bright in appearance, but are dull. We will now take up these processes in detail as applied to copper, silver and nickel plating. The amateur is strongly advised to begin with copper plating, as the cost is comparatively slight, and copper solutions are much easier to work.

In the discussion which follows, it is assumed that the articles to be plated are fairly clean and smooth to start with. If not, the ordinary use of file, emery paper, and the finest crocus paper, should make them so. It will also be assumed that the reader has only his hands to work with, although a rotating polisher driven by foot power is almost a necessity for extensive work.

Assuming that the article to be plated has been treated as hinted above, until its surface is smooth, the next thing is to prepare a bath, which will render its surface chemically clean. If the article is of copper, brass, steel, or iron, make up a solution by mixing together two quarts of water, ½ pint (8 ounces) of sulphuric acid, and ½ ounce each of nitric and hydrochloric acids. Be very careful in handling these acids as they will destroy everything they touch, when in the concentrated state. Be sure to pour the acids into the water, when mixing, and not the reverse. Put this solution into two glass fruit jars, and label them "Pickling Solution."

For the sake of definiteness, let us assume that the article to be plated is of lead or pewter, and that it is to be copper plated. Prepare in a large open glass jar, a solution of copper sulphate (blue vitriol), in the proportion of one pound of the sulphate to 2½ quarts of water, with 4 ounces of sulphuric acid added after the crystals are dissolved. Procure a sheet of clean copper about four inches square, and punch two holes at two adjacent corners. The holes are to receive two small copper wires by which the plate is to be hung in the solution. Across the top of the jar containing the solution, lay a brass or copper rod, and suspend the plate from it by two copper wires, so that the plate hangs immersed in the solution, and close to one side of the jar.

For battery power to do the plating, perhaps the amateur can do no better than to use two freshly prepared gravity batteries, connected in series. Connect the copper pole of this battery, to the rod which supports the copper plate in the solution. Lay another rod across the top of the jar, and connect the zinc pole of the battery to this rod. The rod serves as support for the articles to be plated.

Having followed these directions we are ready for plating. The connections are shown in the accompanying figure, where for the sake of clearness, only one cell of gravity battery is shown. Attach a copper wire to the article to be plated, by passing it through any hole that may be in the article. If there are no holes, try to fasten the wire to some unimportant part, such as the bottom, for where the wire touches the article there will be no deposit of copper. Then, holding the article by the wire, immerse it in one jar of the pickling solution. It should be left there for two or three minutes, and then transferred to the second jar. After remaining there for the same length of time, lift it out by the wire, taking care not to touch it with the fingers. Rinse it in a jar of fresh water, and immediately transfer it to the plating bath, hanging it from the rod connected with the zinc pole of the battery.

This is indicated by A in the accompanying figure. As soon as the article is hung from the wire, current begins to pass, and copper will be deposited upon the article. The length of time required to secure a good deposit will vary with the size of the article, condition of batteries, etc., but one hour ought to give deposit in most cases, under the conditions indicated. As many articles can be plated at the same time, as can be hung from the rod A. They should be turned around now and then, so as to present different sides toward the plate P, as the side nearer the plate will receive the heavier deposit. The greater the distance between the plate and the articles, the less will be the difference between the deposits upon the two sides. In our next chapter, we will see how to treat the finished article, and how to do nickel and silver plating.

(Part II will appear December 27.)

GREAT PYTHON SERPENT IS DEAD.

Ate No Food for Two Years and Five Months.

The great python serpent of the Paris Jardin des Plantes has just died, after fasting for two years, five months and three days. This finely marked python came from Japan. It was 21 feet long, in prime condition and extremely lively when it arrived, but refusel all food. It was offered a Dahomey sheep, rabbits, geese, ducks, fowl. It would occasionally strangle the animals or birds placed in its cage, but under no circumstances would it eat them. The python took a bath from time to time. At length it lost weight and strength, and its scales turned a dull gray. Toward the beginning of this year it became extremely lean, and remained curled up in a corner of its cage, and quite harmless. Its keepers compelled it to swallow eggs, but the food apparently was undigested. The different organs of the serpent became inert one after another. Its weight when it came from Japan was 165 pounds; at the time of its death it weighed 60 pounds. Its loss of weight was thus 66 per cent., a larger proportion than has ever been observed hitherto in any animal.—London Daily News.

Girl Climbs to Top of Sky-Reaching Smoke-Stack

Throng Below Dumfounded at the Daring Feat -- Money and Presents Showered on the Heroine

The highest thing in Marseilles, Ill., is the great smokestack of the W. D. Boyce Paper Mills, which seeme to pierce the sky with its ornamental "cap" 164 feet from mother earth. The stack is of the new mills which have just been completed after being burned in the fire of 1901. When the people of Marseilles and the members of the W. D. Boyce Company gazed on this towering, sky-reaching tube of stone there was a consensus of opinion that its completion ought to be marked with some kind of a celebration, and a celebration there was. The prettiest women of Marseilles and the handsomest men and all the most prominent people in the city were present. Champagne flowed in profusion at a midday luncheon and tables groaned with tempting edibles. Then the merry crowd gathered round the lofty stack.

"Who'll dare climb to the top?" yelled one of the Boyce company, addressing the throng.

"The finest watch in Marseilles to the climber! Who'll attempt it?" shouted another, and then there followed a long painful silence and women grew dizzy as they gazed at the forbidding height.

"I will," shouted a clear, silvery voice from a quarter where had assembled a group of Marseilles' younger social set, and people all looked in the direction of the voice to see a winsome miss wearing a hat with a great plume advancing to the front with raised hand. The skeptical looked on in wonderment and then shouted in laughing, mocking tones.

But soon the derisive laughter ceased. The young girl—Ada Tryon was her name—carried in her hand a bouquet of American beauty roses and she grabbed from her friends a couple of great flags bearing the stars and stripes. She said no other word than the "I will," but walked straight toward the stack. Reaching the great door at the base she gracefully lifted her skirts of laces and soft flowing cloth, and stepped inside and sight of her was lost to the throng.

Now many eyes were trained toward the top of the stack and some peered at the door which the girl had entered, probably expecting to see her lifeless body fall to the ground. They waited impatiently and excitement was at its highest tension when way up out of the top of the altitudinous pile the stripes of the American flag were seen to stream. Following appeared the head and then the body of the young girl. She waved the flag to the breeze, grasped the other flag and waved it in her other hand; then pinned American beauty roses on both flags, and then, standing erect on the very top of the topmost stone she showered her roses on the gasping throng below. People who, until now, had been too astounded to speak burst forth in one tremendous cheer that seemed to sway the stack with the force of its sound.

Miss Tryon and the Tower She Climbed

Then the girl disappeared from sight again and started down. She descended by the same means she had climbed to the top—a frame work in the interior that had been employed by the workmen. It was known to have been absolutely substantial, but few thought the girl would have the indomitable courage to perform the deed she had dared to attempt. When her pretty form was seen to leave the mouth of the stack a hundred men pressed forward to grasp her valiant little hands.

"Young lady, you're game," said W. D. Boyce, and he presented her with a splendid gold watch. Women tore the flowers from their tresses and dresses to shower upon her. A labor leader pushed his way through the crowd and handed her a card making her an honorary member of the American Federation of Labor. Money was presented her by the Federal Labor Union and people of all classes vied with each other to honor the heroine of the celebration marking the completion of one of Marseilles' greatest industries.

UNCLE SAM'S WHITEWASH RECIPE.

A whitewash used on government buildings is made as follows: Take a half bushel of unslacked lime, slack it with boiling water, cover during the process to keep in steam, strain the liquor through a fine sieve or strainer. Add to it a peck of salt previously dissolved in warm water, three pints of ground rice boiled to a thin paste stirred in while hot, half a pound of Spanish whiting and one pound of glue previously dissolved by first soaking in cold water and then by cooking in a small pot hung in a larger one filled with water. Add five gallons of hot water to the mixture, stir well and let stand a few days covered as nearly airtight as possible. It should be applied hot, for which purpose it can be kept in a portable furnace.

SAUSAGE WHILE YOU WAIT.

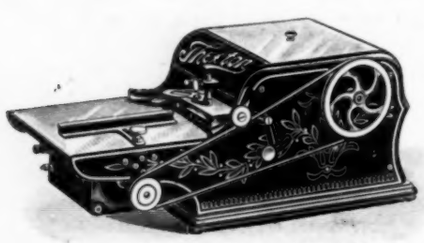
"Another new waiter has come and gone," said the veteran of the 15-cent restaurant as he deposited a beef stew in front of his favorite customer. "What was the matter with him?" asked the favorite customer. "Well, it wasn't exactly his fault," explained the veteran. "You see, the second day he was here a customer comes in and asks for a brace of Frankfurters. 'Sausage is all out,' says the new waiter, 'but if you wait awhile I think I can get you some.' He was so eager to be obliging that he was going to send across the street for 'em. Well, sir, as he went through the door into the kitchen he happened to tread on the dog's tail. The dog set up a howl, and the customer yells: 'Hey, there! Never mind that sausage; I guess I don't want it!' Then he puts on his hat and goes out. The boss saw the whole thing, and that night the new waiter was paid off, and quit. Pretty tough, wasn't it?"

SEALS ENVELOPES BY ELECTRICITY.

Remarkable Little Machine That is to Revolutionize Old Methods.

Sealing envelopes by electricity is the latest method of saving time, which Americans have learned to realize, is as valuable as money. What the typewriter is to letter writing or the linotype machine to type-setting, is the little electric sealer to envelope sealing. It is regarded as a remarkable invention and it will be only a short time until no office, where economy of time is regarded as an object, will be without it. Many of the greatest commercial firms in the country adopted the machines as soon as their success was demonstrated and already they are in use in the offices of J. P. Morgan & Co., Marshall Field & Co., and the leading commercial houses in New York and Chicago. Nothing quite so convenient has made its appearance on the market in many a day. The machine—it is called the duplex—is simple of construction and with it a child can seal as many envelopes as several grown people could under the old methods. Its capacity is 8,000 an hour. Besides after the envelope is sealed there is no danger of its coming loose. Each envelope leaves the machine free from moisture and tightly sealed. There is no soiling of envelopes, no smearing of address, no finger marks, no mistakes.

The sealers are built in different sizes, to take direct current of 110 to 115 volts; direct current, 220 to 235 volts; alternating current 104 to 116 volts, 7,200 alternations, 60 to 62 cycles. The envelope is fed by hand into the front of the machine and comes out sealed and ready for immediate use. The flap of the envelope automatically passes through a moistening device, after which it is caught by feed rollers and carried through the machine to a press roller where it is firmly sealed. The machine will occupy about half the space and costs less than a typewriter. There is not a screw in it to get out of order and it is as substantial as it is neat and expeditious in its work.



Electric Envelope Sealer

"Mamma," asked Young Curiosity, "when deaf and dumb people cheer, do their fingers get tired?"—Lippincott's Magazine.

GOVERNMENT TOWER AT SAN ANTONIO.

The United Sattes Army tower at Government Hill, San Antonio, Texas, is so greatly admired by government architects and by the public in general that this style of tower, it is said, is to become universal in army forts to be constructed in the future. The tower, rising to a height of more than 200 feet, gives a splendid view of not only all the grounds and buildings

Model Government Tower

of the fort but of the entire city of San Antonio and the surrounding country. It is a favorite point of observation for visitors. The drill grounds here are also among the finest in America. They are built on a splendid elevation and surrounded by the elegant homes of the army officers.

INTERESTING AND INSTRUCTIVE.

"Popular Mechanics:—Your favor of Nov. 12 advising me that my subscription had expired is received and I hasten to renew for a year. I have been a subscriber for some time to the Scientific American, which, of course, is a most excellent publication, but for my purpose 'Popular Mechanics' is by far more interesting and instructive, and I believe if it were properly called to the attention of the reading public here, that you would increase your subscription list materially. Personally I shall use my efforts in helping along your interests, at the same time those of the public." Yours truly, D. A. Petre (Real Estate), Duluth, Minn.

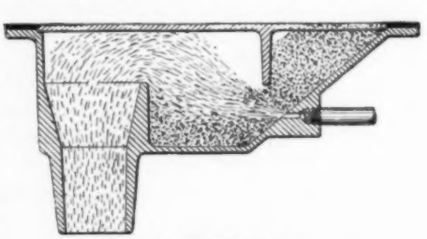
REMARKABLE INLAND CRUISE.

Boat Sails From New York Via Chicago to the Gulf of Mexico.

The Cero, a smart little ketch rigged craft owned by H. S. A. Stewart of Pittsburg, Pa., is about to complete one of the most remarkable cruises ever attempted on the inland waters of America. The boat is 65 feet long, 51 feet keel, 17 foot beam and 4 foot draft. It has two masts, the main mast being 68 feet high and for emergencies a 16 horsepower gas engine. The boat started from New York June 17, went up the Hudson and through the Erie canal to Buffalo and to Detroit. Thence it proceeded to Mackinac Island and to Lake Superior, where it followed the Canadian shore for about 400 miles. Returning to the Soo the boat made for Mackinac Island again and then followed a run to St. Joseph, Mich., where the boat remained three weeks for repairs. Then the Cero made a run across the lake to Chicago. Thence it proceeded via the Chicago river, sanitary canal, and Illinois river to the Mississippi. Going down the Mississippi a few days were spent in St. Louis and Memphis. At New Orleans the owner of the boat with his wife and sons got aboard and they will sail to Miami, Fla., and during the winter to Havana. The boat is manned by Charles Jarritt, the captain, and a full crew.

AIR BLAST SANDER FOR LOCOMOTIVES.

A recent improvement in sanders for locomotives is shown in the cut. A jet of compressed air carries sand from the



Air Blast Sander

reservoir over the partition which at other times prevents its flow. The sand then passes down the sand pipe to the rail.

WHERE OUR EXPORTS GO.

The destination of our present immense exports of manufactures is interesting. Sixty-two per cent goes to European countries and 23 per cent to Canada and Mexico; Asia gets 8.2; Australia and New Zealand, 7; South America, 6 per cent, and Africa, 3 per cent. Of these exports $44,000,000 worth were of steel and almost an equal amount were of copper; $40,736,000 of refined petroleum; $21,000,000 of leather goods; $10,500,000 of agricultural implements, and $6,741,000 of drugs and dyes.

HE'S HAD NO SHOW.

Joe Beall 'ud sit upon a keg
  Down to the grocery store an' throw
One leg right over t'other leg
  An' swear he'd never had no show.
    "O, no," said Joe,
    "Hain't hed no show,"
Then shift his quid to t'other jaw,
An' chaw, an' chaw, an' chaw, an' chaw.
He said he got no start in life,
  Didn't get no money from his dad,
The washin' took in by his wife,
  Earned all the funds he ever had.
    "O, no," said Joe,
    "Hain't hed no show,"
An' then he'd look up at the clock,
An' talk, an' talk, an' talk, an' talk.
"I've waited twenty years—let's see—
  Yes, twenty-four, an' never struck,
Altho' I've sot roun' patiently,
  The fust tarnation streak er luck.
    "O, no," said Joe,
    "Hain't hed no show,"
Then stuck like mucilage to the spot,
An' sot, an' sot, an' sot, an' sot.
"I've come down regerler every day
  For twenty years to Piper's store;
I've sot here in a patient way,
  Say, hain't I, Piper?" Piper swore.
    "I tell ye, Joe,
    Yer hain't no show;
Yer too darn patient"—ther hull raft
Jest laffed, an' laffed, an' laffed, an' laffed.
—Sam Walter Foss.

HOW TO USE CEMENT IN COLD WEATHER.

In cold climates the employment of concrete has its objections, in that the material will freeze before it sets, and upon thawing is found to be practically worthless. In such cases the operation of setting may be hastened by dissolving two pounds of carbonate (not bicarbonate or cooking) soda in one gallon of water, boil the solution and use it in mixing the concrete with whatever adidtional water is required; the water and sand should also be heated. This heat will remain long enough to allow the concrete to set, which should be about forty-five minutes. Subsequent freezing, if the mass is not thereby cracked, will not injure the concrete.

BUTTON CARDING MACHINE.

A machine that will sew buttons on a card has been invented by William J. Pugh, of Davenport, Ia. Ever since buttons supplanted thorns as a means of fastening clothing they have been sewed onto the cards by hand. This is a slow and expensive method and inventors for many years have endeavored to devise a mechanism for doing the work by machinery. In the method invented by Mr. Pugh the loose buttons as they are coming from the finishing machine are scooped into the carding machine. Here a revolving cylinder catches them up, straightens them right side up and pushes them against a card to which they are fastened by wire staples threaded through the button eyes and twisted tight upon the back side of the card.

ARTISTIC GROUP OF STATUARY.

"Spinning" is another of the five interesting groups of statuary that will adorn the Textiles building of the St. Louis

World's Fair. The group will consist of three figures. The central one holds the cocoon, thus introducing a third branch of the textiles industry, the manufacture of silk.

She—I see by the paper that some Filipino women wear a corset made of woven bamboo.

Her Husband—Well, well sort of a waist basket, isn't it.

A man feels blue with trouble, purple with cold, red with rage, white with fear, yellow with envy and green with jealousy.

TURBINE'S LOW CONSUMPTION.

Authoritative tests of the steam turbine shows a remarkably low steam consumption—in some cases below eleven pounds per indicated horse power under conditions not at all ideal, says Electrical World. Even the best friends of the steam turbine do not claim that it has reached a final state of development, and there is strong probability that considerably higher efficiencies will be attained, particularly owing to the adaptability of the steam turbine to the use of superheated steam at temperatures entirely beyond the range of the reciprocating engine. The case made out for the steam turbine unit by the advocates is one of strength.

SHOP NOTES

ATTACHING A LIGHT WATER-JACKET TO GASOLINE ENGINE.

In a paper before the Institution of Mechanical Engineers, London, Capt. C. C. Longridge discribed a novel, but simple

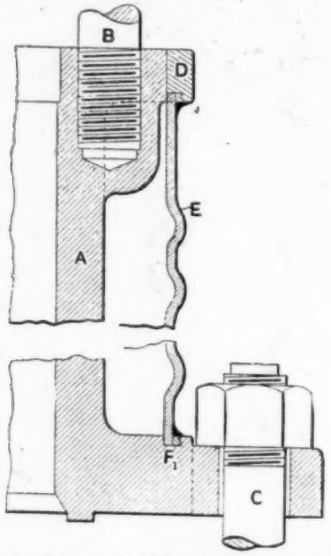


Fig. 1.—Showing How Water Jacket is Attached

method of attaching a water-jacket to the cylinder of a gasoline engine. Reference to the cut, Fig. 1, will make plain the following explanation: A the cylinder; B C studs securing cylinder head and frame; D iron or steel ring forced over the cylinder head and grooved to receive the jacket;

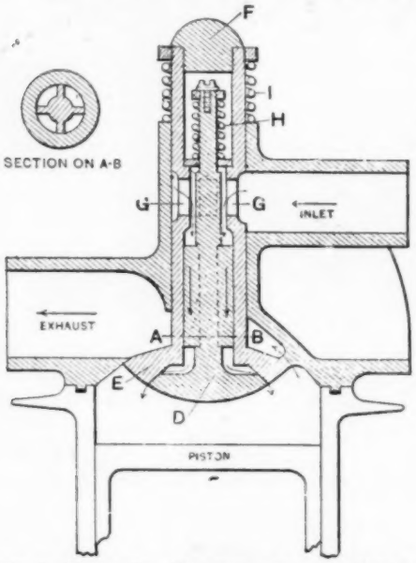


Fig. 2.—D'equevilly Combined Inlet and Exhaust Valve

steel metal jacket; F F copper wire calked into groove, black surfaces represent solder if added.

He also describes a new combined inlet and exhaust valve for gasoline engines. Referring to Fig. 2: The exhaust valve E is recessed to receive the inlet valve D. F the cap of the exhaust valve spindle, is actuated by a two-to-one shaft and rod, not shown. I is the exhaust valve spring; H a weaker spring for the inlet. The shock of the exhaust spring closing, bounces the inlet valve at the same moment. The inlet valve stem is fluted, as shown in section across A B, forming channels for the charge to the head of the valve.

NEW ENGLISH OIL BURNER.

A new oil burner is attracting much attention in England is known as the "Hydroleum." The London corespondent of the Automobile Review says of it:

The cut shows clearly the form of this burner, with which Texas oil, that can be bought here at 2 pence per gallon in lieu of gasoline at 14 pence, can be employed. It is only necessary to raise steam to a pressure of 5 pounds to the square inch to start the burner and this is done by means of an auxiliary burner, using methylated spirit. The fierceness of the fire is then entirely under the control of the steam jet, which induces a flow of the heavy oil from a float feed chamber exactly in proportion to the velocity of the steam jet. The mingled steam and atomized oil impinge on a dash brick suitably placed and there igniting, from a mass of flame in a fire pan placed beneath the boiler in the situation occupied by the gasoline burner as at present used. I have seen steam raised in a boiler with this system from cold to 200 pounds per square inch in 12 minutes, and it is stated that the steam and fuel have been cut off and re-ignited by the heat of the system after standing two hours. The future of this fitting, as applied to light cars, is being watched with the greatest interest.

"HYDROLEUM" BURNER, NOW ATTRACTING MUCH ATTENTION IN ENGLAND.

TO CLEAN CHASED BRASS.

Benares ware, or chased brass of any kind, may be cleaned thus: Wash well with hot water and soap and dry thoroughly; then rub all over with a lemon cut in half. When it looks quite clean rinse well in warm water, dry and polish with a chamois leather. Chased work of any kind should not be cleaned with powder.

PRACTICAL MECHANICAL MOVEMENTS.—PART II.

In Popular Mechanics last week was given an introduction to this article, which is taken from Enterprise. The following completes the interesting list of practical mechanical movements as shown in the accompanying illustrations:

47. Link-motion for locomotives. The slotted link is moved up and down over the wrist pin block by the lever and connecting rod; the lever, locking in the toothed sector, allowing for a close connection to the valve stem by a lever and short connecting rod.

48. Valve-motion and reversing-gear. The slotted link receives a rocking motion from the eccentrics and rods, and is thrown from its center either way for forward or backward motion of the engine by the lever secured thereto.

49. Safety stop for elevators. When the cable breaks, the bow spring will force the plungers secured to the bell-crank levers outward into engagement with the racks.

50. Mangle-rack, guided by rollers and driven by a lantern half pinion. The long teeth in the rack act as guides to insure a tooth mesh at the end of each motion.

51. Breast-wheel. The power of this wheel equals about forty per cent of the value of the waterfall flowing through the gate.

52. Single-acting pumping-beam. Parallel motion is received from a sector beam. The cylinder is open and the piston is lifted by the weight of the pump rods on the other end of the beam. Movement of the piston is reversed by atmospheric pressure.

53. A gyroscope or rotascope. The outer ring is fixed to a stand. The intermediate ring is pivoted vertically therein. The inner ring is fixed in the intermediate ring at right angles thereto, and the globe is pivoted at right angles to the inner ring.

54. Wheel-work used in the base of a capstan. The central gear is fast to the shaft. The intermediate pinions are loosely mounted upon a frame secured to the drum. The gear ratchet ring runs on the shaft.

55. Scroll gears. For increasing or decreasing the speed gradually during one revolution.

56. Pantograph. For reducing or enlarging copies of drawings. The free ends of the arms are provided with drawing instruments which are adjustable. The

point of connection between the two intermediate arms is fixed.

57. Diagonal catch and hand gear used in large blowing and pumping engines.

58. Ball and socket tube joint.

59. Toe and lifter working puppet valves in steam engines. The lower arm or toe is secured to a rock shaft operated from the engine shaft and is adapted to raise and lower the lift or upper arm which is secured to the valve rod.

60. A rotary engine. This engine has two abutments and two inlet and exhaust ports.

61. A horse-power tread-wheel. The horse is placed below the shaft and between the spokes which are arranged at the sides of the wheel.

62. A four-way cock.

63. A swape, or New England sweep. The weighted end of the pole overbalances the bucket so as to divide the labor of lifting the water.

64. Ordinary screw-propeller

65. Chain-pump.

66. Rotary engine, in its simplest form.

67. Hydraulic ram. The "Montgolfier" idea for a fountain supplied by a water ram.

68. Means whereby rectilinear motion of variable velocity is imparted to a vertical bar by turning a shaft having a curved slotted arm thereto.

69. Friction gear. Variable speed is obtained from the pair of cone pulleys, one of which is the driver. The intermediate double-facer friction pinion is moved from one end to the other of the cones.

70. Barker wheel. The reaction of the water escaping from the tangential orifices at the ends of the arms under the pressure of the water-head in the hollow shaft gives impulse to the wheel.

71. "Root" rotary blower. The extended surface of the periphery of the wheels allows them to run loosely in the shell without friction, and with very small loss by air leakage.

72. An elastic wheel having a steel spring tire with jointed spokes.

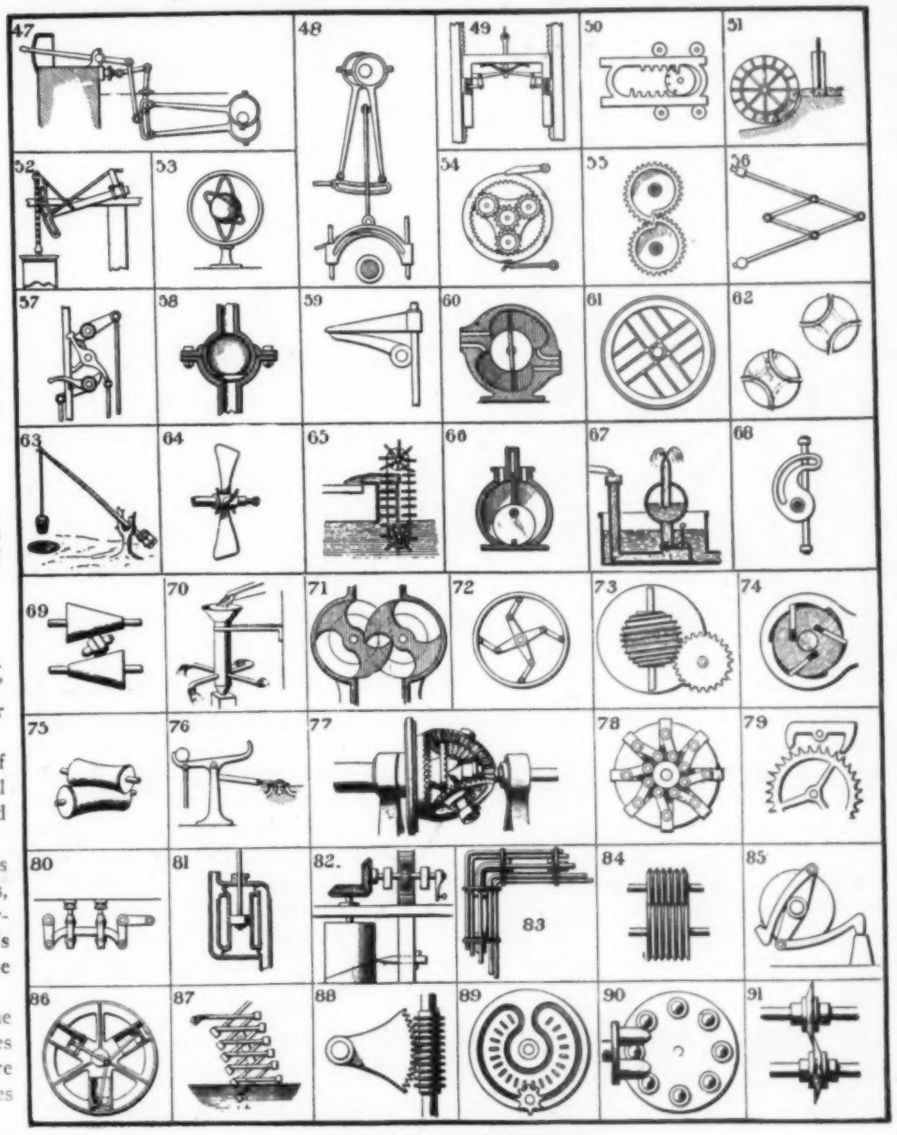
73. Globoid spiral gear-wheels. The revolution of the globoid gear gives a variety of differential motions to the spur gear, as it swings between the limits practicable with the globoid teeth.

74. Ratchet head with spring pawls.

75. Means for transmitting rotary motion to an oblique shaft by means of contracting drums having concave faces.

76. A reversing movement for a pump valve. The piston rod trip carries the ball frame beyond the level, when the ball rolls across and completes the valve throw.

77. Multiple speed-gear in line of shaft. The small intermediate gear is secured to the small shaft. The central intermediate gear is secured to the large shaft, while the large intermediate or end gear is fixed to the bearing. The side beveled pinions are revoluble with the large shaft. With this device speed may be increased or decreased on a continuous line of shafting according to the relative number of teeth in the different gears.



Practical Mechanical Movements

78. Toggle joint cam movement, for throwing out a number of grips at once, by the movement of the jointed ring within the disk.

79. Anchor escapement for clocks.

80. Cam-bar valve-movement. The horizontal movement of the cam bar by the bell crank lever alternately moves the two valves.

81. Double acting lift and force pump.

82. Rack and pinion movement for tracing spiral grooves on a cylinder.

83. Right angle shaft coupling. A number of right-angle steel rods move freely in perforated guide flanges on the ends of shafts that are arranged at right angles. In this manner motion may be imparted from one shaft to the other.

84. Grooved friction-gearing.

85. Revolving rapid blow-hammer.

86. Rotary multi-cylinder engine. The cylinders revolve with the fly-wheel and the crank to which the pistons are secured is eccentric thereto.

87. Pendulum water-lift.

88. Means whereby a rectilinear vibrating motion may be imparted to a spindle having an endless worm gear, by a spur-gear sector.

89. Mangle-wheel with equal motion forward and return. The end of the shaft of the pinion is slidably mounted within the groove and retains said pinion in mesh.

90. Tin-tooth wheel and pinion.

91. Disk shears.

ELECTRIC FROST SIGNAL.

Electric-light signals are to be placed in a tower 220 feet high in San Jose for the benefit of fruit growers. During the months of February, March and April the orchardists are to be warned by colored lights of the approach of frosts, which would enable them to smudge, by burning oil, etc. During September, October and November the approach of showers will be indicated.

HANDY ELECTRICAL DICTIONARY

VEST POCKET EDITION

Compiled and Edited by WM. L. WEBER, M. E.

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SAVING TIME IN MAKING DRAWINGS.

A writer in the American Machinist gives some excellent hints for draftsmen. He says: Fig. 1 shows a needle point which is made by cutting off the end of a wooden pen holder; the end is then beveled off and a hole put in the center. Now take a No. 5 needle and break it off about one inch from the pointed end, grind the broken end sharp and then hold it with a pair of pliers and drive it into the pen holder, letting the point project about ⅜ of an inch. As the pen-holder is tapered it cannot roll off the desk. You should make two of these pins and you will be surprised at the many times you will have occasion to use them. There is a certain firm who make all their drawings on a special extra heavy grade of paper, and ink them in for reference. It is a "criminal offence" to push a thumb tack into any part of those drawings; but these pins can be put through and through hundreds of times and no harm will be done.

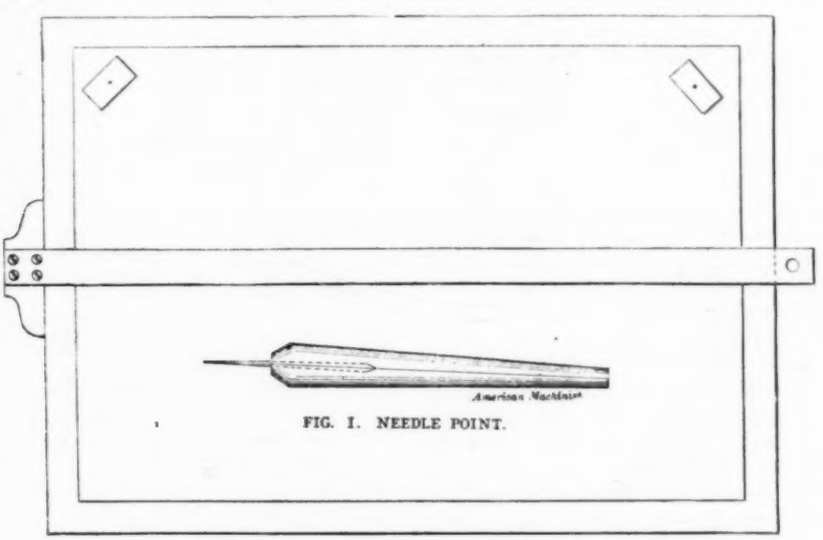

FIG. 1. NEEDLE POINT.

The rectangular figure shown in Fig. 2 is intended to represent a piece of tracing paper; it is very thin and easily torn. For this reason, take a piece of heavy paper about a foot or 18 inches square, and coat it all over on one side with mucilage; when dry, cut up into small pieces, about ½x¾ inch, and when you are working on tracing paper, just stick one of these on each corner and place your pin right through into the board. You may have half a dozen or more tracings on your board, but you can pierce the points through all of them.

One other thing: So many drawings look so dirty that you can scarcely see the lines. The secret in keeping a drawing clean is not to wash your triangles with soap and water; just wipe them off with a rag, and, instead of sliding them over the paper, pick them up and carry them where you want them, or else slide them on the corner, so as to have a line only, in contact with the paper. Never slide anything over your drawing; keep your elbows and the points of your fingers off the paper. Never put a pad on your drawing; just look at the pad, underneath it is always full of dirt. If you want to figure, put a piece of clean paper on the drawing and then put your pad on it.

FIG. 2. HOLDING TRACING PAPER ON THE BOARD.

Solon once said: "Laws are like cobwebs, for if any trifling or powerless thing falls into them they hold it fast."

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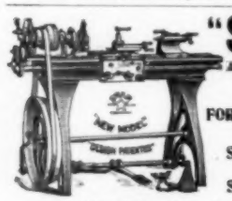

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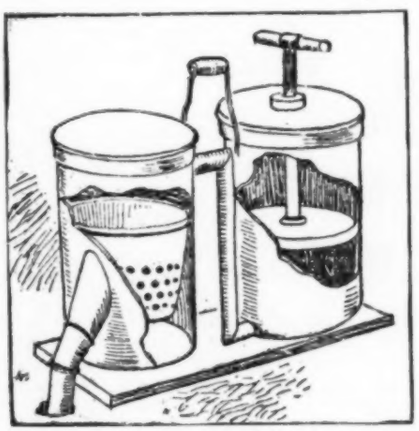
KILLS RATS IN THEIR HOLES.

A device for asphyxiating rats and other burrowing animals with gas has been invented by Lorenz N. Cornett of Natividad, Cal. The apparatus consists of a fuel chamber, in which charcoal or some other substance which will give off obnoxious fumes is placed, and a compression cylinder and plunger. The two parts are connected by a tube leading from the bottom of the compressor to the top of the fuel holder. Another tube leads downward from the fuel holder into the mouth of the rat hole. A fire is kindled in the perforated receptacle provided for that purpose. The plunger of the compressor is forced down and the fumes are driven through the pipe into the burrow. The animal is either suffocated in a short time or will make his appearance at the mouth of the burrow when he can be killed by a dog or with a stick.



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I saw her go shopping in stylish attire,
As she felt of her belt at the back;
Her walk was as jaunty as springy steel wire,
And many a rubberneck turned to admire,
As she felt of her belt at the back.
She wondered if all the accoutrements there
Were fastened just right, or were out of repair,
As she felt of her belt at the back.

I saw her at church as she entered the pew,
And she felt of her belt at the back;
She had on a skirt that was rustly and new,
And she didn't quite know what the fastenings might do,
So she felt of her belt at the back.
She fidgeted much while the first prayer was said,
She fumbled around while the last hymn was read,
Then felt of her belt at the back.

Jack told her one night that he loved her like mad,
And she felt of her belt at the back;
She didn't look sorry, she didn't look glad,
She looked as if thinking, "Well, that isn't bad,"
And she felt for her belt at the back.
But—well, I believe 'twas no very great harm,
For what would the maiden expect but arm—
When she felt for her belt at the ba

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